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ABSTRACT

This paper describes technical and educational issues related to the development of SIMMPATICO, a multimedia tool for the teaching of Portuguese as a foreign language. The first section presents an overview of the motivation for the project. Package organization is discussed in the second section, including the linguistic approach and its methodological organization, and the hypermedia structure and interface/icon study. The third section covers technical aspects, including hardware requirements, sound, image, computer-generated animation and images, and video. The conclusion addresses evaluation methods and plans for the prototype testing of the system, as well as the goal of developing an online version of the system and anticipated problems related to this goal. Three figures illustrate: hypermedia relations; the background image, dialogue icons, and video control buttons; and SIMMPATICO's font and main character. A table presents the video production chain. (DLS)

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An Hypermedia Multilevel Interactive Language Learning Tool

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Abstract: Due to the increasing need of educational tools for the Portuguese language learning by foreign people and also by the great community of lusophone countries spread around the world, emerges the Simmpatico Project which tries to fulfil that gap using the possibilities created by the new Information Technologies. This paper describes technical and educational issues related with the development of this project.

1. Introduction

The decision to construct a multimedia tool for the teaching of Portuguese as a foreign language is linked to the importance which this language has assumed in the world today, both in terms of numbers of speakers, and of its distribution over all the continents. Having been worked on for more than a thousand years, permanently enriched by the contributions of the multiple variants of Europe, America, Africa and Asia, the Portuguese language, spoken by more than 150 million people, as a mother tongue, second language or official language, is part of the universal heritage.

"Portuguese is a living element in political, economic, cultural and scientific exchange between the peoples of Africa, Asia, America and Oceania. It is therefore a matter of placing the Portuguese language in the position it deserves to occupy in international affairs, in a world where its contribution – on account of the wealth and diversity of cultures which it vehiculates – can reinforce international Cupertino between nations." [OSPINA 1985]

The structure of the course, conceived primarily for the teaching of Portuguese as a foreign language, permits, however, with some alterations, its use in support of the teaching of Portuguese in the lusophone African countries (countries where Portuguese is the official language) and even in the teaching of Portuguese as a mother tongue (being able to facilitate and stimulate teaching through appropriate, interactive use of the techniques of hypertext).

2. Package Organisation

2.1 Linguistic Approach

The target population for this course is young people and adults who have acquired several types of competence through the learning of their mother tongue and probably through the learning of one or more

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foreign languages (or a second language) – linguistic competence, metalinguistic competence, narrative/discursive/textual competence, pragmatic competence (communicative / metacommunicative).

There exist, however, significant individual differences in relation to linguistic knowledge, which are linked to a great number of interdependent factors: aptitude, motivation, memory, attitude towards target language, time given to learning, quantity and type of input in the target language, socio-economic, educational, and affective factors, knowledge of the mother tongue and other languages.

These differences will cause significant variation in the speed and effectiveness with which the learners are capable of creating and putting to work a control mechanism, i.e. the way in which they will retrieve the appropriate knowledge from several separate knowledge's (modular structure), causing the posterior integration of these several knowledge's. The objective of this course is to facilitate the installation and development of these retrieval procedures, in such a way as to make them progressively more automated [McLaughlin & Rossman & McLeod 1983].

The non-reflective acquisition of knowledge is not, however, incompatible with the process of becoming aware of the way in which the learner solves his/her learning difficulties. This course therefore presents (relatively brief) descriptions of the levels of language functioning – phonological/phonetic, morphological and morphosyntactic – which we consider indispensable for the construction of representations of the linguistic structure of Portuguese.

In this way, we appeal to the metalinguistic capacity of the user (conscious representation of the properties of the various utterances) and to the capacity/possibility of transferring prior linguistic knowledge (especially lexical knowledge, which is normally neglected in favour of syntactic orthodoxy) to the resolution of problems (especially in comprehension tasks) [E.Kellerman 1977] [E.Kellerman 1978a] [E.Kellerman 1978b] [Kellerman & Sharwood 1986] [Ringborn 1987] [Miranda 1996]. The grammar is presented explicitly in order to help the learner to explicit (gain awareness of) the way in which he/she understood and interiorized the workings of utterances – through multiple choice exercises using paraphrases, rules, judgements of acceptability/grammaticality.

2.1.1. Methodological Organisation

The course consists in a set of teaching modules divided into three levels: Level 1 (real beginners); Level 2 (post-elementary); Level 3 (pragmatic/cultural). With Level 1, the learner should be able to recognise and produce isolated words and simple sentences (at a relatively slow speed of oral discourse), being able to communicate with native speakers on matters of daily routine, obtaining essential information, understanding and producing simple (and essentially written) instructions. With Level 2, the learner should be able to participate in verbal interaction with native speakers, understanding and expressing opinions on topics (which go beyond themselves and their personal sphere), at a speed of oral discourse which is progressively closer to intercommunication between native speakers. With Level 3, the learner should have acquired sufficient autonomy in Portuguese, to be able to understand authentic documents (written – literary texts and non-literary texts covering sociocultural and oral aspects – songs and media documents, talk-shows, news, interviews).

The course is conceived as a "journey", a path through the several "scenes of daily life", and attempts to cover a wide range of interests: tourism/travel, business/shopping, food, sport, etc. Each one of these levels is made up of a particular number (not necessarily the same number) of thematic units approached in specific situational contexts [Casteleiro et al. 1988].

The situations of communication are organised in successively smaller units (exchanges and speech acts), made explicit through utterances whose difficulty depends on the level in which they are situated. The themes and situations of communication are repeated in the first two levels, helping the learner to transfer and reuse the various "knowledge's" and motivating him/her to construct (or make more complex) some situations. This can either be done by introducing variations in the extra-linguistic parameters and reconstructing the web of discourse accordingly, or by modifying the semantic-pragmatic structure of the to fit new communicative intentions.

Example:

Level 1 – *Topic:* Tourism/Travel *Situation:* In the hotel/reception. A couple are looking for accommodation; they ask for information - Dialogue on video, possibility of visualising the text by means of subtitles corresponding to each utterance, or even the whole text of the dialogue. Slow discursive speed (non-native)

Level 2 – Same *topic*, same *situation*.

- The text of the interaction which took place at level 1 is repeated, but the dialogue becomes more and more complex, the verbal exchanges are in greater number and the discursive speed is closer to the "native mode".
- From this situation, two new situations are created which do not exist at level 1, one for oral production (telephone conversation) and one for written production (the female character writes a postcard, in the hotel bedroom).

Some of the elements of this situation can be transferred (re-used) to another situation (in the same thematic unit or in different thematic units).

The course comprises:

- Various exercise types, according to the capacities which are being developed in each step: exercises which are more focused on the structure of the language, paraphrase/lexical expansion exercises (reduction and integration), confrontation exercises and text/discourse production, the written transcription of oral register, the reconstruction of texts/according to a framework of discourse types.
- Explanatory and systematic tables of grammatical elements and their functioning (using a grammatical metalanguage which can be easily understood by the majority of users).
- Assessment exercises, with the respective answer keys or suggestions (appropriacy).
- A Portuguese/French/English dictionary, based on Basic Portuguese [Port. Fund. 1984].

2.2. Hypermedia Structure

Our program structure tries to cope with a correct integration of day to day communication dialogues with, up-to-date hypermedia concepts into an intuitive, and interactive, human-machine interface. The multiple communication dialogues originated various digital video records in a coherent sequence, organised in 3 learning levels. Text labelling is synchronised with each video and translates ongoing dialogues. Both video hot-spots and text labelling have hypermedia connections to other information structures as depicted in [Fig. 1]. These different hypermedia elements contents have a relation with culture, nature, local/national tourism, geography, etc, producing an integrated environment to understand the local/national socio-cultural signature as a whole.

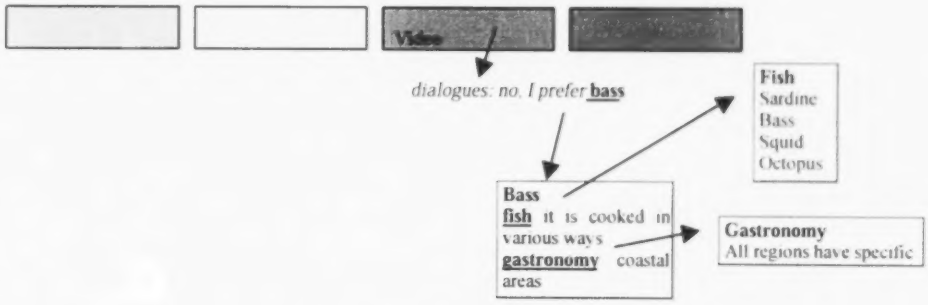

Figure 1: Hypermedia relations.

2.2.1 Interface/Icon study

The interface project took into account the program's usability, interactiveness and its various options. The interface icons try to translate common day to day situations using intuitive symbols within a creative perspective. The next figures, [Fig. 2] and [Fig. 3] represent some of our interface proposals.

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Figure 2: From left to right and top to bottom, background image, logo, dialogue situation icons and video control buttons.

Figure 3: Simmpatico's font and main character.

3. Technical Aspects

As in any multimedia application it was defined a target machine with a set of minimum requirements to play the SIMMPATICO multimedia piece: IBM-PC or compatible; MS Windows 95 or above; 16 MB of RAM; 4X CD-ROM drive; 16 bits sound card; Graphic Card with a minimum of 256 colours at a resolution of 800x600; MPEG-1 enabled hardware or software decoding capacity.

These requirements are the result of a constant optimisation process during the development phase, with the purpose, that even a common and simple multimedia machine can run the application . As a consequence of this, a wider range of potential users is reached by our project.

The development of the application is being done on a well known multimedia authoring tool - Authorware. This program has long been the leading tool for computer-based training and interactive learning.

With the developing of a multimedia application, there are various types of media to produce, process and finally integrate in a main program. Each type of media as is own characteristics, and production cycles.

Sound - Every sound was originally recorded in studio, and afterwards digitised with the aid of a professional sound card at a 22,050 kHz, 16 Bits and Mono quality. By doing this, a quality sound is obtained and the associated files are in a very acceptable size (Data flow of 43KB/s). After that, every sound file was processed with the use of the Animator SoundLab, namely the tools for noise removal and sound equalisation. In the end, the sounds obtained were of excellent quality and with a reduced file dimension.

Image - The multimedia application makes use of original artwork and also of photos, icons and vectorial drawings contained in popular clipart CD-ROM's. The original artwork was digitised in a Umax PowerLook 2000. All this material was then processed and manipulated using the Photoshop and some of its plugin filters from Kai's Power Tools. The final images were limited to the maximum resolution of 800x600 with a colour depth of 256 colours and were saved in DIB graphic format. This type of graphic format is one of many with direct integration in Authorware. In the end all images were reduced to a common 256 colour palette with the purpose of avoiding strange colour shifts in systems with only 256 colours.

Computer-Generated Animation and Images - Certain concepts and ideas that could not be easily explained, with real videos or images, were created in virtual animations or graphics. All this was made possible, thanks to the use of modern 3D Graphic Packages like 3D MAX, which can create still or animated images. All the animations were produced in the FLIC format which is directly integrated in Authorware. The still images were first generated in the popular BMP format and later converted to the already referred DIB

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format. With all animations and images great efforts were made in the creation of a global palette, to avoid the

Video - This was the most challenging and difficult media to produce, process and integrate, because of the huge quantity of data involved. Initially the decision of delivering the final videos in the so popular AVI format

terms of storing it in a single CD-ROM. So a different approach was followed, the compression of the videos in the MPEG-1 format. The use of this compression method gave a significantly reduction in the video file sizes,

Pentium 120MHz and 48MB of RAM. The video production chain was the following:

1. Recording the scenes and scripts on studio or on location, using U-MATIC SP equipment. The actors were recruited among the members of the University Theatre Company with a special care for the actor's

the sound recorded during the video shoots, because any noise could interfere with the comprehension of the dialogues.

Analog Editing with the purpose of cleaning the raw video footage's from the major part of unwanted to reduce the amount of data to be processed in the

next steps.

digitalisation process was made with the parameters referred in [Tab. 1]. Special care was taken with the video sound tracks, to ensure a maximum purity of sound in the dialogues.

Digital Editing on Premiere. The original captured files were here edited and assembled in AVI video

user. The most significant parameters of the AVI's files are in the [Tab. 1].

5. Video Sound Tracks Processing on Animator SoundLab. Due to the high sound gain in the Miro card and some noises generated during the precedent steps, every video file had to be processed in respect to its sound of 50% on the sound volume level and afterwards a digital filtration with a band-pass filter to remove unwanted noise.

Codification in MPEG-1 format on a MPEG Encoder. As a mean to reduce the large amount of video a MPEG-1 compression of the AVI's was made. The size of the video files was reduced has the [Tab. 1] indicates, while maintaining a good image and sound quality level. of video and

audio quality.

	Digitalisation Miro DC30	*Premiere*	*Codification*
Codec	M-JPEG Codec V4.0		MPEG-1
Compression		None	Quad-speed CD-ROM
	384x288	320x240	
Number of Colours	16M (24 Bits)		16M (24Bits)
Fps	15	15	15
Audio	PCM 22KHz 16Bits Mono	PCM 22KHz 16Bits Mono	PCM 22KHz 16Bits Mono
Compression Time	-	-	4 min
File Size	10,624MB	3,890MB	1,521MB

Table 1: Video Production Chain

4. Conclusion and Future Work

The dialogues corresponding to the various situations of communication (Levels 1 and 2) have already been recorded, and the descriptive/explanatory tables of the several grammatical topics and the dictionary are nearing completion. The next tasks will be the completion of the exercise banks and the selection and digitalisation of the documents to be used at Level 3.

Given that this is a research project, we believe that tracing mechanisms should be included to enable the system to be perfected, while at the same time permitting self-assessment to take place. These mechanisms will

further permit the elicitation of feedback which will be important for the evaluation of our strategy of "back to lexico-grammar" or of "lexico-grammar refresh".

The first prototype will be tested with foreign students who frequent Portuguese university courses (Erasmus/Socrates programme), and the International Summer Course (July 1998).

One of the important goals in the SIMMPATICO project is to develop an "on-line" version of the final application. For this purpose we used the Shockwave technology, with which anyone can easily convert and transform a regular desktop multimedia application to a *web-based* multimedia application. This technology picks a desktop multimedia piece and creates a compressed runtime version of it, that will play across Intranets or over the Internet using the networking services of a simple HTTP client.

The major drawback in this technology is the fact that Shockwave doesn't support streaming audio and video over a network. So as a consequence we have to limit in great extent the audio and video contents of the "on-line" application in comparison to the desktop version. If this problem isn't serious over a fast Intranet, it becomes a great burden to the overall performance and joy of use when the application is delivered over the slower Internet. The potential user has to wait until the video and audio parts are downloaded before he can start using the application, so if there is a great amount of video and audio information on the piece, the starting delay time could be very frustrating, leading him even, to not explore the application at all.

In conclusion great cares have to be taken, to create a low-bandwidth demanding application with less or smaller video and audio files. Also in the graphical interface some changes have to be made to make a *lighter* piece as possible, that is, a application that will play nicely and smoothly even over the Internet.

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